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PCT / SE 2005 / 000113

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1. Your reference — P18399GB-NF/jsd

2. Patent application number *(The Patent Office will fill this part in)* — 0402666.2

3. Full name, address and postcode of the or of each applicant *(underline all surnames)* — Autoliv Development AB
Patent Department
S-447 83 VARGARDA,
Sweden

Patents ADP number *(if you know it)* — 00321018006

If the applicant is a corporate body, give the country/state of its incorporation — Sweden

4. Title of the invention — "Improvements in or Relating to an Air-Bag"

5. Name of your agent *(if you have one)* — Forrester Ketley & Co.

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)* — Forrester House
52 Bounds Green Road
London
N11 2EY

Patents ADP number *(if you know it)* — 133001

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application	Date of filing *(day / month / year)*

8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

Answer YES if:

a) any applicant named in part 3 is not an inventor, or
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Yes

Patents Form 1/77

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form	
Description	8
Claim(s)	2
Abstract	1
Drawing(s)	3 +3

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent (Patents Form 7/77)	
Request for a preliminary examination and search (Patents Form 9/77)	One
Request for a substantive examination (Patents Form 10/77)	
Any other documents (please specify)	

11. I/We request the grant of a patent on the basis of this application.

Signature(s) Forrester Ketley & Co. Date 6 February, 2004

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

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PATENTS ACT 1977

P18399GB-NF/jsd

DESCRIPTION OF INVENTION

"IMPROVEMENTS IN OR RELATING TO AN AIR-BAG"

THE PRESENT INVENTION relates to an air-bag and more particularly relates to an air-bag provided with one or more mounts, such as apertured mounts, to mount the air-bag in position.

It has been proposed previously to provide many types of air-bag which incorporate a mounting region or mounting tabs to mount the air-bag in position. One particular form of air-bag of this type is the so-called inflatable curtain. An air-bag of this type is disclosed in GB2297950A .

Figure 1 illustrates part of an inflatable curtain air-bag. The air-bag has an inflatable region 1 which has a generally linear upper edge 2. The inflatable region 1 is formed by two superimposed layers of fabric which are secured together at selected regions. In some cases the air-bag is formed using a one-piece weaving process, in which selected regions of the two layers of fabric are co-woven to form a single layer of fabric. In the part of the air-bag shown in Figure 1, the two layers of fabric of the inflatable region are woven together in an area 3 to form an non-inflatable area, and are also woven together in regions 4 and 5 which form seams separating individual inflatable cells 6 and 7. A gas supply duct 8 is defined which extends adjacent the upper edge 2 of the air-bag,

as is conventional. The gas supply duct is in fluid communication with the inflatable cells 6, 7.

The upper edge 2 of the air-bag is provided with a plurality of protruding mounting tabs 9 each provided with an aperture 10. The mounting tabs may be used to mount the air-bag in position.

On inflation of the air-bag, when mounted in position in a motor vehicle by the mounting tabs 9, a very substantial force is applied to the mounting tabs. In order to minimise the risk of the tabs tearing under such forces, it has been proposed to reinforce the mounting tabs by providing extra material, or by folding the material over on itself to increase the thickness of the mounting tabs, or by providing additional reinforcing sewing. All of these expedients, however, increase the weight and cost of the air-bag.

In other forms of air-bag the mount may be a ring-shaped mount surrounding a large aperture that receives a gas generator. The mount typically has apertures to receive bolts on a flange of the gas generator. Again the mount is typically reinforced by making the mount of increased thickness, or by sewing on an extra layer of reinforcing fabric.

The present invention seeks to provide an improved air-bag.

According to the present invention, there is provided an air-bag, the air-bag being formed from fabric and having an inflatable region and at least one mount, the or each mount being formed from fabric woven to have a random or quasi-random distribution of floats.

Preferably, the floats each pass over between two and eight underlying yarns.

Advantageously, the or each mount is formed from two adjacent layers of fabric.

Conveniently, the two adjacent layers of fabric forming the mount are stitched together.

Alternatively the two adjacent layers of fabric forming the mount are laser-cut. In this way the outer edges of the layers of fabric become thermally bonded together.

Conveniently each mount is a protruding mounting tab.

Advantageously each mount is apertured.

In order that the invention may be already understood, and so that further features thereof may be appreciated, an embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of part of a prior proposed air-bag,

FIGURE 2 is an enlarged view of part of an air-bag in accordance with the present invention,

FIGURE 3 is a diagrammatic view illustrating typical hopsack fabric weave,

FIGURE 4 is a diagrammatic view illustrating a weave as used in the invention, and

FIGURE 5 is a graphical figure.

In the preferred embodiment of the invention at least the mounting tabs of an air-bag are made using a specific weave, which incorporates a random distribution of floats, which will be described hereinafter. In the preferred embodiment the mounting tabs are made by two layers of this fabric which are stitched together.

Referring to Figure 2 of the accompanying drawings part of an air-bag in accordance with the invention is shown, the air-bag being an air-bag having a design corresponding generally to that of the air-bag as shown in Figure 1. It can be seen that in the embodiment illustrated in Figure 2, the air-bag is formed using a one-piece weaving technique. The upper-most edge 2 of the air-bag is formed into a substantially gas impermeable seam 11 by co-weaving two separate layers of fabric which form the rest of the air-bag, a one-piece weaving technique being utilised. The two separate layers of fabric 12, 13 diverge beneath the seam 11 to form the gas flow duct 8.

The mounting tab 9 which extends upwardly from the upper edge 2 of the air-bag is again formed from the two layers 12, 13 of fabric, but in the region of the tab, the layers 12, 13 of fabric are stitched together by a peripheral line of stitching 14, to provide the tab with the desired integrity. Alternatively, the tabs may be laser-cut from the fabric, the edges of the fabric layers of each tab being molten and fused together to provide the desired integrity. The mounting tab is again provided with a central aperture 10.

In the region of the tab 9 a "special" weave is utilised for the fabric as will now be described.

In many prior proposed air-bags a hopsack weave is used for the fabric of the air-bag. A hopsack weave is illustrated in Figure 3. In a hopsack weave, a plurality of immediately adjacent warp yarns pass together "in parallel" over and under selected groups of weft yarns which also pass over and under precisely the same sets of warp yarns. Referring to Figure 3, six warp yarns 21 to 26 and six weft yarns 27 to 32 are illustrated. It can be seen that the first three warp yarns 21 to 23 form a group of warp yarns which extend "in parallel", passing over and under exactly the same sets of weft yarns. Also it can be seen that the warp yarns 24 to 26 form a second group of yarns which pass over and under the same selected sets of weft yarns in a similar fashion. Similarly the weft yarns 27 to 29 form a group of yarns which extend "in parallel" over and under the same sets of warp yarns, and the weft yarns 30 to 32 form a second group which pass over and under the same selected sets of warp yarns.

Thus, in this embodiment of hopsack, groups of three warp yarns pass over and under groups of three weft yarns and vice versa. Hopsack can be created using groups of yarns comprising two or more yarns in each group. A hopsack weave is easy to fabricate, but does not have substantial tear-resistance.

The embodiments of the invention utilise a new weave, the weave having a random or "quasi-random" distribution of "floats". A "float" is where one yarn passes over at least two underlying transversely extending yarns. In

preferred embodiments of the invention, the floats may extend up to a length such that a float will cover eight underlying yarns.

Figure 4 illustrates an example of the weave of the invention. Figure 4 illustrates a plurality of warp yarns including yarns 33 to 37 interwoven with a plurality of weft yarns including weft yarns 38 to 42.

It can be seen that the weft yarn 38 initially passes over the two warp yarns 33, 34 together forming a float, and passes under the warp yarn 35, over the warp yarn 36, and then continues. The weft yarn 39 passes over the warp yarn 33, beneath the warp yarn 34, over warp yarn 35, beneath warp yarn 36 and over warp yarn 37 and thus, in the region described, does not experience any "floats". The weft yarn 40 passes under the warp yarn 33 and then above the two warp yarns 34, 35 forming a float, then passing under the next two adjacent warp yarns 36, 37 forming another float.

The weft yarn 41 passes over the warp yarn 33, beneath the next adjacent warp yarns 34, 35 forming a float, above the warp yarn 36, and beneath the next adjacent warp yarn 37. The weft yarn 42 passes beneath the warp yarn 33, and then above the warp yarns 34, 35, 36 and 37 forming a float which extends across four underlying yarns.

It will be understood that the floats are provided in a random or quasi random manner, with no immediate regular repeating pattern. Floats may extend over any number of underlying yarns, although in the preferred embodiments of the invention the maximum number of yarns passed over by a float is eight.

Figure 5 is a graphical figure of load plotted against extension, illustrating a comparison of tear-resistance for a conventional hopsack weave and an example of the new improved weave described above.

It can be seen that the tear-resistance for the new weave is substantially greater than the tear-resistance of the conventional hopsack weave.

Whilst the invention has been described with reference to an air-bag in the form of an inflatable curtain, the invention is not restricted solely to air-bags of this type but may be utilised with any air-bag which has one or more mounts, such as apertured mounts. Thus the invention relates to an air-bag where the mount is a region surrounding a large opening that receives a gas generator, the region having apertures that receive bolts on the flange of the gas generator. The region may be formed from two super-imposed layers of fabric.

It has been found that by utilising a weave as described, an air-bag is provided having mounting tabs which have improved tear-resistance, but without tensile strength being compromised. The fabric is a flexible structure which facilitates the folding or assembly of the air-bag. The fabric is found to be more flexible than a conventional hopsack fabric. An air-bag is thus provided having enhanced strength, without the addition of separate reinforcements or the like. The overall weight and cost of the air-bag is thus not increased simply to enhance the tear-resistance of the mounting tabs.

When used in this Specification and Claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

The features disclosed in the foregoing description, or the following Claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS:

1. An air-bag, the air-bag being formed from fabric and having an inflatable region and at least one mount, the or each mount being formed from fabric, woven to have a random or quasi-random distribution of floats.

2. An air-bag according to Claim 1 wherein the floats each pass over between two and eight underlying yarns.

3. An air-bag according to Claim 1 or Claim 2, wherein the or each mount is formed from two adjacent layers of fabric.

4. An air-bag according to Claim 3 wherein the two adjacent layers of fabric forming the mount are stitched together.

5. An air-bag according to Claim 3 wherein the two adjacent layers of fabric forming the mount are laser-cut.

6. An air-bag according to any one of the preceding Claims wherein each mount is a protruding mounting tab.

7. An air-bag according to any one of the preceding Claims wherein each mount is apertured.

8. An air-bag substantially as herein described with reference to and as shown in Figures 2 and 4 of the accompanying drawings.

9. Any novel feature or combination of features disclosed herein.

ABSTRACT

"IMPROVEMENTS IN OR RELATING TO AN AIR-BAG"

An air-bag is disclosed which is formed from fabric (12, 13) and has an inflatable region (1), and at least one protruding mounting tab (9). The or each mounting tab (9) is formed from fabric woven to have a random or quasi-random, distribution of floats. In a preferred embodiment, the floats each pass over between two and eight underlying yarns.

FIGURE 4.

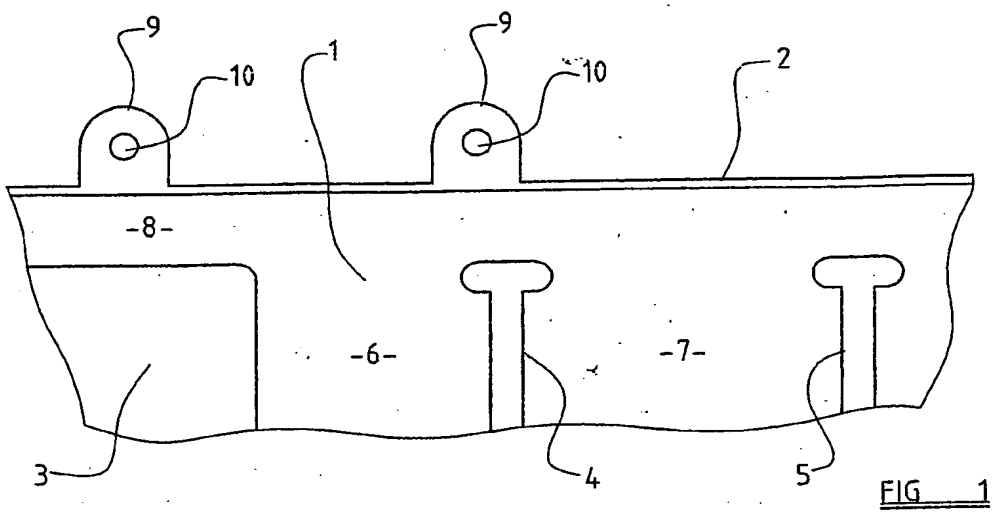

FIG 1

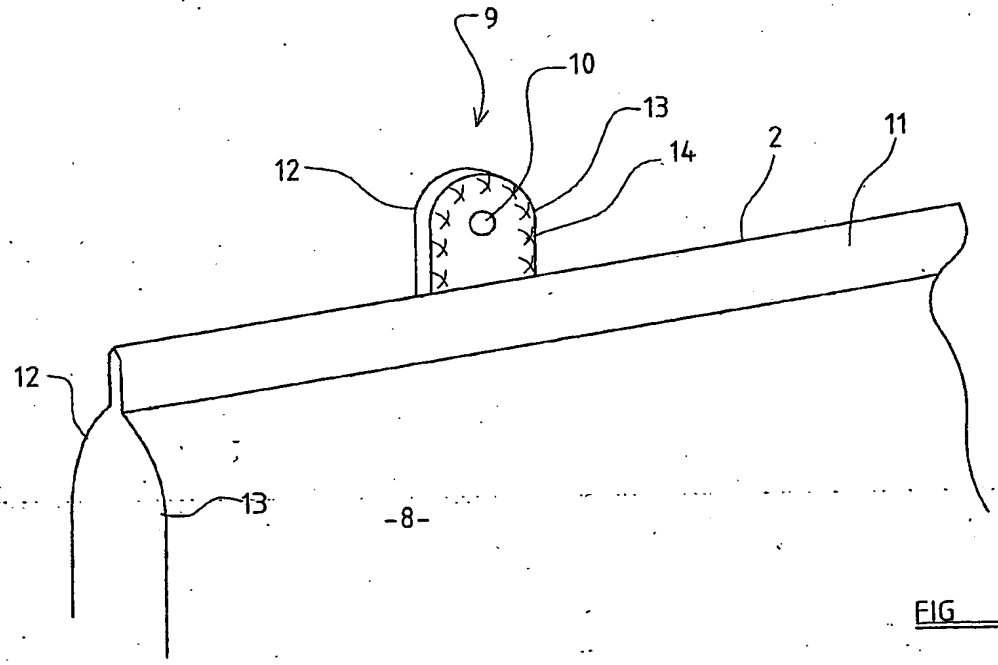

FIG 2

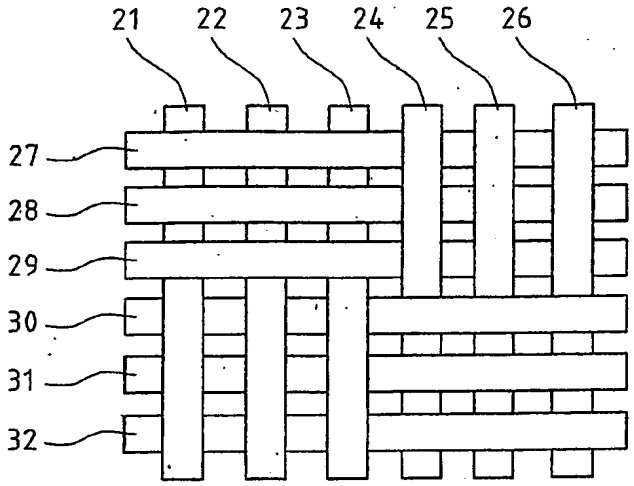

FIG 3

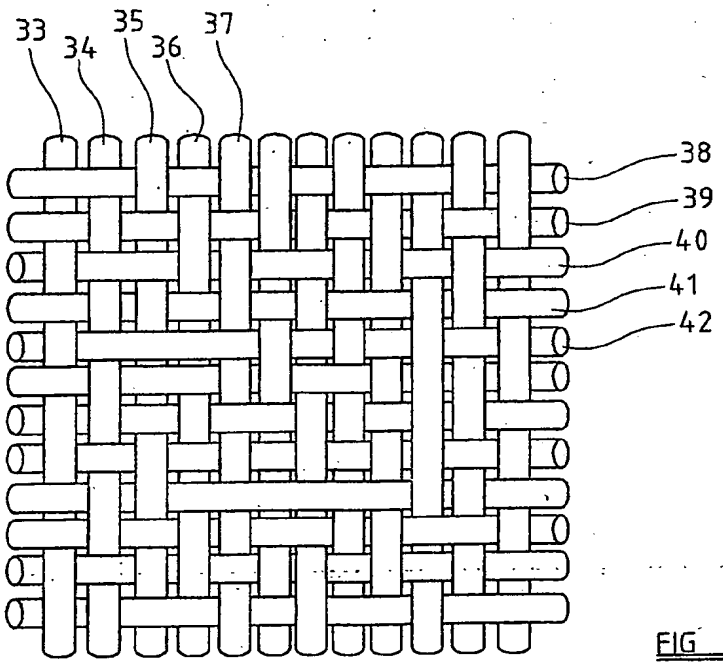

FIG 4

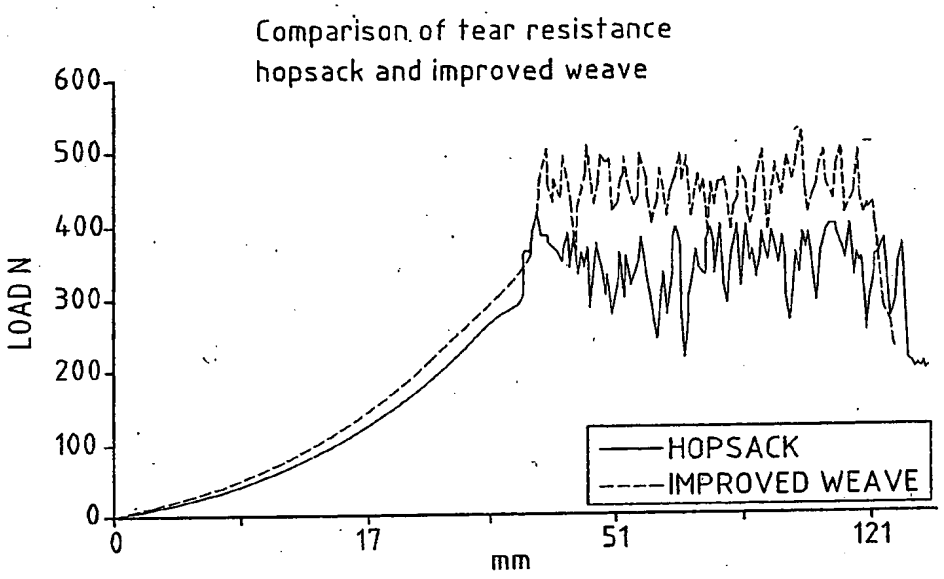
Comparison of tear resistance
hopsack and improved weave
600
500
400
300
200
100
0
LOAD N
0
17
51
121
mm
HOPSACK
IMPROVED WEAVE

FIG 5